ON A GIANT TURTLE FROM THE QUEENSLAND LOWER CRETACEOUS.

By Heber A. Longman.

(Plates XII and XIII and Two Text-figures.)

It has been a matter of surprise to those interested in palæontology that the Queensland Cretaceous formations have as yet yielded comparatively few remains of the giant reptilian forms which characterised Mesozoic faunas. The paucity of described species is probably due to lack of systematic research, and, as time goes on and our inland areas are better known, further fossil remains, perchance providing novelties rivalling the grotesque monsters of other lands, may be exhumed. A collection of fossils found on Sylvania Station, twenty miles west of Hughenden, gives encouragement to this hope, for these, although fragmentary, point indubitably to the presence of a giant Chelonian whose proportions are not dwarfed by the monster turtles of the London Clay or the American *Archelon* and *Protostega*.

The Queensland Museum is indebted to Mr. F. L. Berney, whose efforts in the cause of Australian science have already made his name familiar with local workers, for the deposition of these valuable remains in our national collections.

Just as in America the first described fragments of the giant *Archelon* and other *Protostegidæ* were supplemented by fairly complete skeletons, so we hope that our Queensland formations will later afford examples which will permit of comprehensive reconstruction and probably shed light on the phylogeny of the group. Although the outlines of the Australian Cretaceous sea are not as yet comprehensively defined, there is considerable evidence for an eastern land barrier connecting Australia with Asiatic regions and also stretching further south. If this barrier were continuous with northern continental regions, associations with our Cretaceous fauna should be more frequent on the western side (where breaks in the land barrier are suggested) than on the Pacific border. W. S. Dun [1] has shown that the marine fauna of Western Australia exhibits "marked affinities (and identity) with European and Asiatic species," but he notes a "lack of community" between the Mesozoic fauna of the west and that of the vast eastern beds (from whence our fossils come). He speaks of these last as a "Cretaceous Mediterranean," and refers to the "numerous species peculiar to the region and many endemic genera among the Mollusca." But this endemic character of our Cretaceous molluscan fauna can scarcely be projected into the accompanying larger vertebrates such as the immense Ichthyosaurians and Plesiosaurians. Similarly we dare not suggest merely a local range for this new giant Chelonian, especially when we remember how cosmopolitan is the habitat of several far smaller turtles at the present day. Thus it is by no means

[1] W. S. Dun, Handbook of Australia, B.A.A.S., 1914, p. 296.

improbable that other remains related to our fossils may ultimately be found in synchronous deposits elsewhere.

Zittel has pointed out that of the imperfectly known Cretaceous and Tertiary marine turtles which have been placed by some authors in independent families, numerous examples are perhaps most nearly related to the *Chelonidæ*.[2] Whilst the plastral plate to be described cannot be associated with any of the forms treated in literature available to the writer, the bones of the shoulder-girdle and limb-fragments point irresistibly to Chelonoid affinities. Until further remains are forthcoming it would be unwise to state an arbitrary systematic position, but temporarily the giant Queensland Turtle may be placed in Gray's family *Chelonidæ* of Baur's superfamily *Chelonoidea,* under the name of *Cratochelone berneyi.* The generic name is in obvious contradistinction to the small *Notochelone costata,* Owen,[3] from the same district, supplementary portions of which were described by De Vis.[4] Here it may be appropriately mentioned that Ramsay noted[5] "a portion of a pelvis," received from Lord Howe Island, on which no generic conclusions could be based, but which he stated "will prove to belong to a large sea-turtle."

CRATOCHELONE BERNEYI, gen. et spec. nov.

(Reg. No. Q.M. F.14/550.)

The fossils consist of four portions of the left shoulder-girdle, with the proximal ends of the left humerus, radius and ulna, and when received these were largely superimposed and the whole crushed down on an incomplete plastral plate, which had also sustained a transverse fracture. All the bones were heavily invested with a fine hard "dirty stone-coloured" matrix, and great difficulty was experienced in exposing the natural contours. Some of the associated cavities were infilled with calcite. Specimens of the common bivalve shell, *Aucella hughendenensis,* Eth. fils, were found in the matrix. A cranial fragment of *Portheus australis,* A. S. Woodward, an Ichthyodectoid fish, also forwarded, is noted by Mr. Berney as found lying with above.

Left shoulder-girdle (Fig. 1, upper view).—The contours of these remains are decidedly Chelonoid. Although the bars are broken off close to the body, the basal curves and the angle between the scapular and its "acromial process" or the precoracoid may be gauged as closely corresponding to those in *Chelone mydas.* Now that the matrix has been removed, the scapular facet of the coracoid may be approximated to its fellow, and here, too, the angles at the base of the coracoid and precoracoid bars and the inward and backward sweep of the former have striking affinities with those in the green turtle. In the fossil the contributing curve with the angle of the precoracoid and its base is more open. On

[2] Zittel, Text-book of Palæontology, vol. ii., p. 198 (Macmillan).

[3] Owen, Quart. Journ. Geol. Soc., 1882, xxxviii., p. 178.

[4] De Vis, Ann. Queensland Museum, No. 10, 1911, p. 3.

[5] Ramsay, Proc. Lin. Soc. N.S.W., 1882, vii., pl. i., p. 86.

taking these bones and noting the bulk of material at the symphysis of the coracoid with the scapulo-precoracoid, it will be seen that in *Chelone mydas* there is relatively a far greater depth of bone behind the glenoid cavity.

Two fragments of the bars themselves were found, one being the distal end of the scapular and the other the corresponding portion of the precoracoid. In their relative proportions these present differences from their living associates.

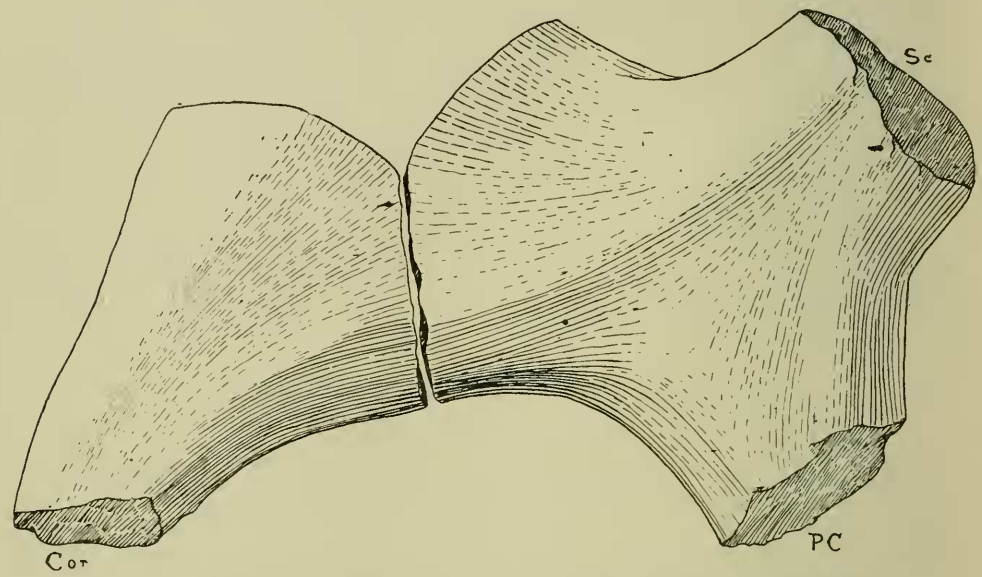

Fig. 1.—*Cratochelone berneyi.* Left Shoulder Girdle; upper view of remains. *Cor*, coracoid; *PC*, precoracoid; *Sc*, scapular.

Del. C. M. Rossiter.

The scapular fragment has a maximum width of 100 mm. (contours abraded), is 38 mm. thick, and the length to the fracture is 200 mm. Compared with that of *C. mydas* it is relatively much thicker. These proportions are reversed in the termination of the precoracoid, which is relatively wider and thinner.

Humerus.—The portion preserved consists of the proximal end of a left humerus with the head and mesial process or ulnar crest. The subhemispherical head is set somewhat obliquely; the portion overhanging the intertubercular fossa is considerably in excess of that on the outer side and the neck is here marked by a sharply defined concavity immediately below the articular surface. As in *Chelone mydas,* the head is greatly expanded transversely in correspondence with the glenoid facets of the coracoid and scapulo-precoracoid. Although the head itself is relatively less deep, the proportions of the whole bone are here very similar to those of the green turtle, the maximum diameter of the head being three-quarters of the maximum diameter of the bone (*i.e.,* surface of head to outer margin), the comparative shallowness of the head being made up by the width of the shaft at the base of the mesial process. Unfortunately, the extreme

CRATOCHELONE BERNEYI Longman.
Ectal view of Plastral Plate. ½ Nat. Size.

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end is missing from the mesial process, but the curves shown evidence a more globose form than the obtusely pointed process seen in adult (but not in immature, where it is spherical) specimens in the Queensland Museum. On the outer or ulnar edge the portion preserved somewhat resembles *Lytoloma* (*Euclastes*) *gosseleti,* Dollo,[6] but the distal curves of the head do not suggest a very bulky lateral process adjoining. Just prior to the fracture, the terminating of the intertubercular fossa is marked by an ascending process (Fig. 2, B), which is the commencement of the tubercular mass adjoining the lateral or radial process.

In section the elliptical contours of this bone, the axes of which are set at right angles to each other, correspond closely to those of *C. mydas.* Dimensions: Max. diam. head, 150 mm.; max. diam. through head and shaft, 203 mm.

Various forms of Testudinate humeri have been studied and figured by Wieland,[7] who points out that they furnish as readily distinguishable and important characters as the carpus. Our bone is undoubtedly of the thalassic

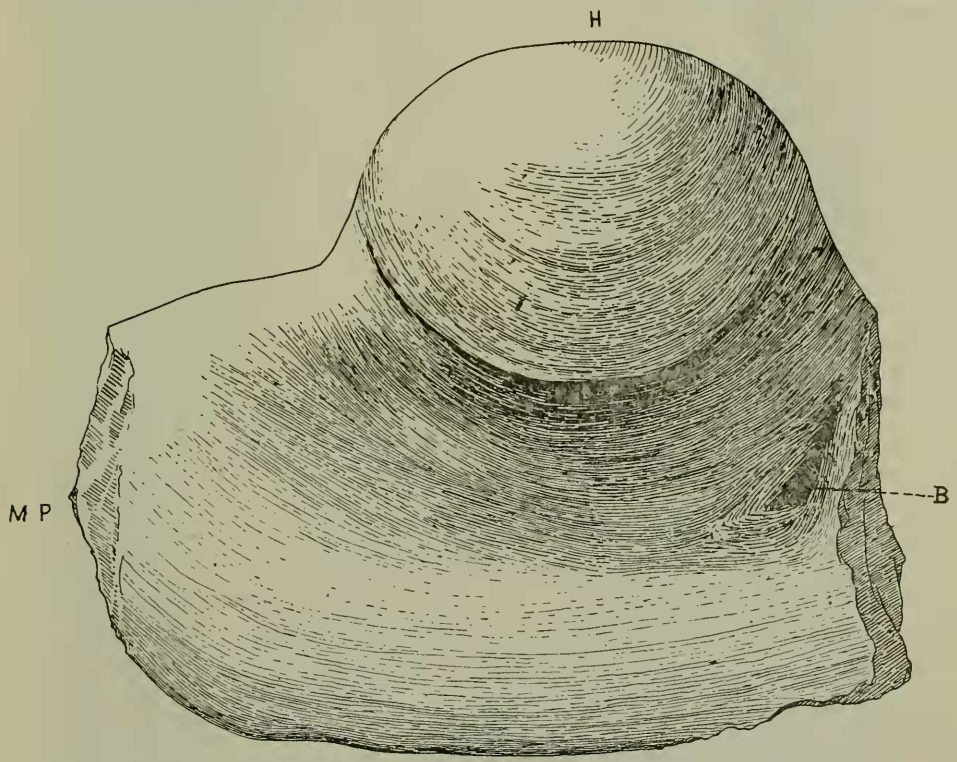

Fig. 2.—*Cratochelone berneyi.* Proximal end of Left Humerus: palmar view. *H*, head; *MP*, mesial process; *B*, base of tubercular mass.

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[6] Dollo, Geol. Mag., June 1888, p. 266, fig. 2.

[7] Wieland, "Evolution of the Testudinate Humerus," Amer. Journ. Sci., 1900, p. 419.

type, as illustrated by *Atlantochelys mortonii,* Agassiz, although the absence of the radial process prohibits adequate comparison. Wieland also notes resemblance between *Atlantochelys* and *Desmatochelys lowii,* Williston.[8]

Radius and Ulna.—About 12 centimetres of the proximal ends only are preserved, and the ectal surfaces of these are incomplete. The proportions of these bones are considerably in excess of the relations borne to *C. mydas* by the other fragments; from this one may infer very powerful fore-limbs and flippers. The robustness of the front flippers in *Toxochelys* and *Archelon* has been demonstrated by Wieland,[9] who, after comparing the Cretaceous remains with those of present-day carnivorous and algaphagous turtles, says: "There is in the comparison just made the very strongest suggestion that *Protostega,* more distinctly than any marine turtle thus far known, hunted prey, which swam actively, and, bearing in mind other features, was perhaps even powerful."

When compared with corresponding portions of a large skeleton of *Chelone mydas,* representing an individual about 5 feet 9 inches, our fossil bones, except where noted, are a little more than twice the size. Following out these proportions, a turtle nearly 12 feet in length is suggested. Some specimens of the genus *Archelon,* described by Wieland, were about 13 feet in length.

Plastral Plate (Pl. XII and XIII).—The evolution of the dermal armours of Chelonians is one of the most perplexing yet fascinating problems to be elucidated by palæontologists, and the researches of such writers as Wieland and Hay in America are here of great value. The plastral plate is therefore the most interesting bone in the collection, and it is a matter for deep regret that the portion preserved is so incomplete. Of this fragment the greatest length is 51 centimetres and the greatest breadth 22 centimetres. The thickness is exceedingly variable, the maximum—33 millimetres—being in the centre on the left of the longer axis. From below this and to the right the plate shelves away and terminates in dactyloid processes. The broken ends of two dactyloid processes are exposed on the lower side of the plate to the right. (*See* Pl. XII.) It has been possible only partially to remove the matrix at this part, but the course of the processes is now apparent. The lowest digit is broken across 60 mm. from its base, but the upper, running apparently parallel to it at a distance of but 10 mm., extends for 130 mm. to its exposed fracture. During fossilisation this digit has evidently been broken, and the distal portion is partly superimposed not far from the base. The course of these processes is almost parallel to the long axis of the plate. On the ental side immediately above these broken digits is a furrow almost deep enough to appear through the plate, and this points to another dactyloid process more robust than the ones seen *in situ.* Within the margin of the anterior edge of the plate on the right are two other furrows, marking the bases of still stronger dactyloid processes, and the adjoining anterior border is chamfered away to a thin edge. (Pl. XIII.)

[8] Williston, Univ. Kansas Geol. Sur., vol. iv., Pal., 1898.

[9] Wieland, Mem. Carnegie Museum, vol. ii., No. 7, 1906, p. 289.

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Ental view of Plastral Plate. $\frac{1}{3}$ Nat. Size.

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In the ectal view, shown in Pl. XII, the surface of the plate is approximately flat, but in the centre a deep depression, scar and transverse fracture mark a position where the limb-bones had been crushed in during the process of fossilisation. Except in the region of the furrows adjoining digital areas, the ental side is convex in section through the short axis. The exposed section on the left shows a number of diploic cavities.

The possibility of this plate being regarded as a left hyoplastron not suturally connected with its accompanying hypoplastron was at first considered. The development of plastral bones in existing *Chelonidæ* leaves at first large vacuities between these portions on each side. These may be noted in the plastra of newly hatched turtles, and the development is beautifully illustrated in W. K. Parker's monograph on the structure and development of the shoulder-girdle and sternum in the Vertebrata.[10] But the evident length of the completed bone in comparison with the width presents difficulties here, and the dimensions and contours also put out of court the probability of a united hyo- and hypoplastron. The writer therefore suggests that the plate may be the centre and greater part of the left side of a large entoplastron. Taking this view into consideration the bone may be compared to the entoplastron of *Archelon ischyros,* figured by Wieland.[11] The dactyloid processes do not show correspondence, but here we should expect diversity, and there is much variability in these even in the same species at the present day. Assuming that the left of the fragment approximates to the centre of an entoplastron, there is no sign of a nether tubercular process, though the incomplete state of the plate does not warrant a statement that it is absent. It may thus have no affinities with the peculiar T-shaped entoplastron characteristic of the *Protosteginæ.* Taking for granted that the centre of the bone is situated near to the left margin, an entoplastron about 4 feet in width is outlined. Following out our comparisons, we find that the breadth of our large *C. mydas* is well over 2 feet in the entoplastral region; but the contours of the anterior plastral bones here give scope at the side for the fore-limbs, and this cannot be imagined for the outwardly curved entoplastron of *Archelon.* But Wieland has pointed out that a greater breadth and "a quite orbicular form" is characteristic of Cretaceous turtles, and thus an extended entoplastron comes within the compass of our proportions. Probably such a plastral bone occupied a position less anterior than its homologue in modern turtles.

Remembering the faulty allocation of fragments by more than one authority in the past, the writer has some diffidence in thus definitely placing this bone, but he has taken the view that the flatness of the plate and the presence of such lateral and posterior dactyloid processes preclude the possibility of its being a nuchal.

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[10] W. K. Parker, Ray Society, 1868, pl. xii.

[11] Wieland, Annals Carnegie Museum, vol. iv., No. 1, 1906, p. 11.